Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Supplementary Examinations December-2021
THERMAL ENGINEERING
(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Explain the phenomenon of knocking in SI engines.	L1	6M
	b	Describe in detail about the factors effecting the knocking.	L2	6M

OR

2	a	Differentiate between two stroke and four stroke engine.	L1	6M
	b	List the applications of Internal combustion and external combustion engines.	L2	6M

UNIT-II

3	An air compressor cylinder has 150mm bore and 150mm stroke and the clearance is 15%. It operates between 1 bar, 270C and 5 bar. Take polytropic exponent n=1.3 for compression and expansion processes. Find (i). Cylinder volume at the various salient points in cycle. (ii). Flow rate in m3/min at 720 rpm. (iii). Volumetric efficiency	L3	12M

OR

4	Air from an initial conditions of 25^{0}C and 1 bar abs is compressed in 2 stage according to law $PV^{1.25}$=constant and with complete intercooling to a pressure of 36 bar abs. Estimate the minimum work required and heat rejected in the intercooler per kg of air. Assume CP=1.05KJ/Kg and R=0.29KJ/Kg K.	L3	12M

UNIT-III

5	a	State the methods of increasing the thermal efficiency of Rankine cycle.	L1	6M
	b	In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar and the exhaust pressure is 0.2 bar. Determine. (i) The pump work, (ii) Turbine work, (iii) Rankine efficiency, (iv) Condenser heat flow, (v) Dryness fraction at end of expression. Assume flow rate of 12kg/s.	L3	6M

OR

6	a	A Steam power plant operates on a theoretical reheat cycle. Steam in boiler at 150 bar, 550^{0}C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550^{0}C and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-S and h-s diagrams. Find: (i) Quality of steam at turbine exhaust,(ii) Cycle efficiency, (iii) Steam rate in kg/kWh.	L3	6M
	b	Explain with the help of neat diagram about Regenerative Cycle.	L2	6M

UNIT-IV

7 a What are the effects of friction on flow through nozzle?   L1   6M
   b What is the effect of friction on the flow through a nozzle? Explain it with the help   L2   6M
      ofh-s diagram.

OR

8 Explain about super saturated flow in nozzles with neat sketch. And represent in H-S   L2   12M
   diagram.

UNIT-V

9 a Draw and explain the velocity triangle of impulse turbine.   L1   8M
   b Derive an expression for work done in impulse turbine.   L1   4M

OR

10 a Draw and explain the velocity triangle of reaction turbine   L1   8M
   b Derive an expression for work done in reaction turbine.   L1   4M

*** END ***